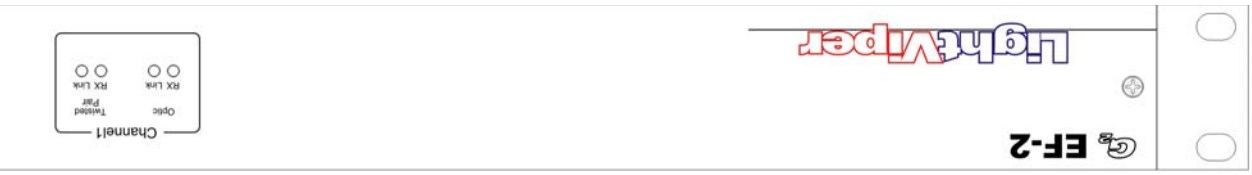
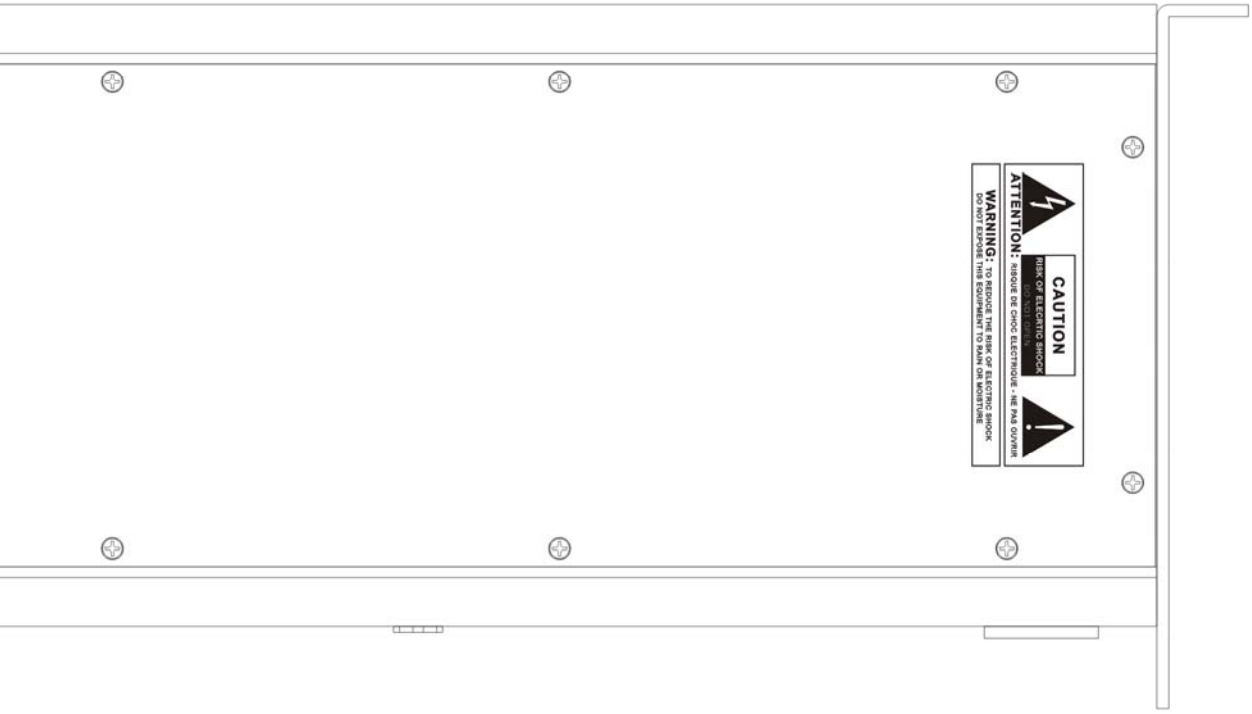
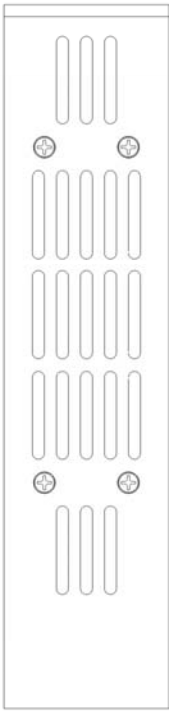
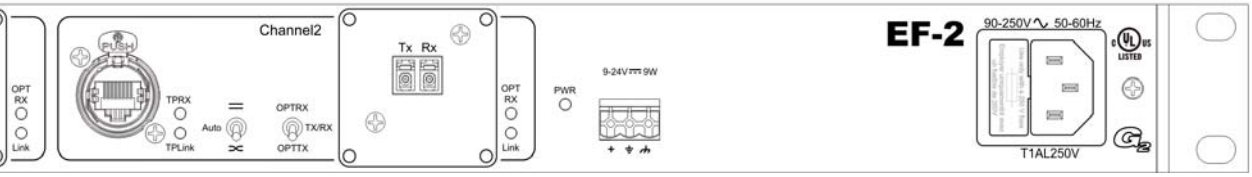








LightViper
FIBER OPTIC AUDIO SNAKE

USER MANUAL FOR
EF-2 Physical Layer Ethernet
Fiber Optic Converter

Warning for Your Protection

1. Read these instructions
2. Keep these instructions
3. Heed all warnings
4. Follow all instructions
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any of the ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

The apparatus shall not be exposed to dripping or splashing. No objects filled with liquids, such as vases, shall be placed on the apparatus.

"WARNING To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture."

Registration

Be sure to register your LightViper product, either by filling in the enclosed Registration Card or by completing the on-line registration form at our Web site:

http://lightviper.com/register

If you do so, FiberPlex can contact you with any update information. As enhancements and upgrades are developed, you will be contacted at the registration address. Please read this manual - if you call for technical support, we'll assume that you have.

Please address any inquiries to your dealer or directly to FiberPlex at:

FiberPlex Inc.
10840-412 Guilford Rd.
Annapolis Junction, MD 20701
301.604.0100 Fax: 301.604.0773
sales@fiberplex.com

Warranty, Service and Terms and Conditions of Sale

For information about Warranty or Service information, please see our published 'Terms and Conditions of Sale'. This document is available on fiberplex.com or can be obtained by requesting it from sales@fiberplex.com or calling 301.604.0100.

Disposal

Disposal of Packing Materials

The packing materials have been selected with environmental and disposal issues in mind. All packing material can be recycled. Recycling packing saves raw materials and reduces the volume of waste. If you need to dispose of the transport packing materials, please try to use recyclable means.

Disposal of Used Equipment

Used equipment contains valuable raw materials as well as materials that must be disposed of professionally. Please return your used equipment via an authorized specialist dealer or via the public waste disposal system, ensuring any material that can be recycled is. Please take care that your used equipment cannot be abused. After having disconnected your used equipment from the mains supply, make sure that the mains connector and the mains cable are made useless.

Declarations of Conformity

Class A Equipment - FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide a reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

Disclaimer

The information in this document has been carefully checked and is believed to be accurate at the time of publication. However, no responsibility is taken by us for inaccuracies, errors, or omissions, nor is any liability assumed for any loss or damage resulting either directly or indirectly from use of the information contained within it.

Introduction

Congratulations on your purchase of a LightViper system. LightViper products are designed, engineered and manufactured by FiberPlex Inc., experts in fiber optics with decades of experience. Our work in audio and data communications products is known in US government applications worldwide. LightViper products combine our fiber optic technology with the highest standards in audio engineering.

The EF-2

You have purchased the LightViper EF-2 system, 2 channel Physical Ethernet Fiber Optic Transport System (FTS) that has ability to pass standard 10 Base-T and 100 Base-T Ethernet communications as well as many proprietary Physical Ethernet based data such as those made by AVIOM™.

The Fiber Advantage

Fiber optics offer many advantages over copper:

- Transmits light rather than electrons
- Transmission over greater distances (more than 2 Km [1.25 mile])
- Complete electrical isolation
- Immunity to RFI and EMI
- Eliminates ground loop problems
- Can be routed overhead, through walls, or underground
- Avoids foot traffic while maintaining aesthetics

Functional Considerations

The Light Viper EF-2 is a very simple device. It is designed to be completely transparent to the data. A single EF-2 actually contains 2 completely isolated and independent channels of Physical Ethernet. Each channels configuration is completely separate from the other. To be completely transparent to the data requires some initial switch settings to achieve the desired result. These settings are described in the later part of this document.

Standard Components

In its standard configuration, the Light Viper EF-2 is made up of three primary components.

2 ea. Ethernet Transport device (EF-2) — This is the hardware interface. One unit is placed on each end of the fiber connection. Each EF-2 can handle two independent Physical Ethernet channels on up to 4 fibers.

The Fiber Cable (TFC-0000-04) — The lightweight “tactical grade” fiber ‘cable’ that carries the digital signal between the stage and mixer boxes. Either PVC or Plenum rated fiber is recommended (VFC-0000-D, VFC-0000-DP) for installation use.

Additionally an EF-2 configuration can use the following component:

TAC-4 Connector Panels (VPL-11, VPL-12, VPL-13) – These 1U rack panels contain (1), (2), or (3) panel mount TAC-4 connectors mounted respectively and allow connection between tactical grade fiber to the ST connectors on the EF-2 units.

Getting Started

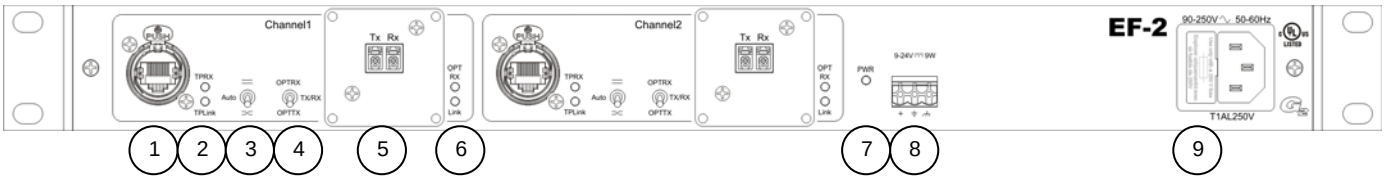
Setup

Setting up, and using your Light Viper EF-2 is a quick and simple process. Just follow these steps:

1. Mount one EF-2 in a rack close to the Ethernet source.
2. Mount the other EF-2 in a rack close to the Ethernet destination.
3. Connect the units to either AC power using the IEC connector or 12VDC using the green modular connector.
4. Connect and run the Fiber between the two units, power up and check the 'link' light on both units
5. Set the switches for the appropriate signal.
6. Connect the data connections to the RJ-45 jacks.

The specific functions of the Light Viper EF-2 (direction, polarity, etc.) are addressed within this manual.

Indicators and Controls



1 **Data connection**

The data connection to the EF-2 is made via a Neutrik™ Ethercon RJ-45 connector. It uses a standard Ethernet pinout which is configured using the Polarity Switch. See appendix for a detailed pinout.

2 **Data Status LEDs**

A Yellow indication on the upper LED marked “TP RX” indicates that receive data is being detected on the twisted pair. The lower LED indicates the Link status on the twisted pair. See appendix for more detail.

3 **Polarity Switch**

Setting this switch to ═══ or ═╳═ sets the pinout of TX and RX to accommodate connection to various devices. With a setting of “Auto”, the EF-2 will determine the correct pinouts for the TX and RX. See the appendix for more detail.

4 **Directional Mode Switch**

The OPT RX and OPT TX positions are both unidirectional modes. In the OPT RX position, data is received by the fiber optic input and transmitted out to the RJ-45 connector. In the OPT TX position data is received by the RJ-45 connector and transmitted to the fiber optic output. The TX/RX position is a bidirectional mode which acts as a standard Ethernet connection. See the appendix for more detail.

5 **Fiber Connections**

The EF-2 comes standard with LC fiber connectors. ST, tactical grade TAC-4 connectors, or Neutrik™ OpticalCon connectors are available as options. In live production use, it is recommended to fit the units with LC connectors and utilize the VPL-11, 12, or 13 panels containing 1, 2, or 3, TAC-4 panel mount connectors respectively. TAC-4JR –LC connectors have LC pigtails which connect with the LC connectors on the EF2. Alternately the TAC-4FR connector can be mounted directly on the chassis of the EF2. Always be sure to use appropriate fiber and compatible connectors.

6 **Fiber Status LEDs**

A Yellow indication on the upper LED marked “OPT RX” indicates that receive data is being detected on the fiber connection. The lower LED indicates the Link status on the fiber connection. See appendix for more detail.

7 **Power LED**

A green LED indicates the power supply is operating correctly.

8 **DC Power Connector**

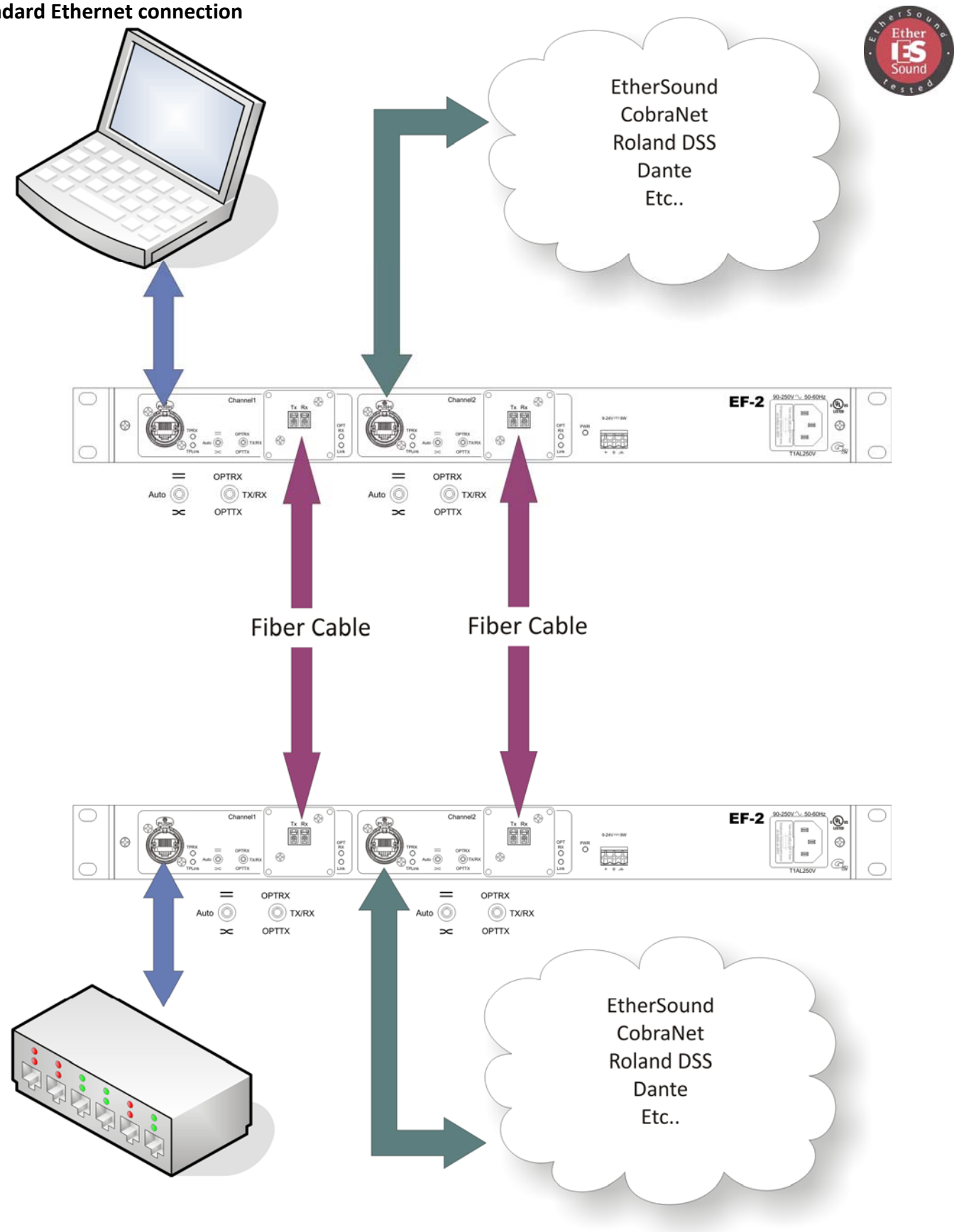
The EF-2 can run on 9-24VDC connected via this connector.

9 **AC Power Connector**

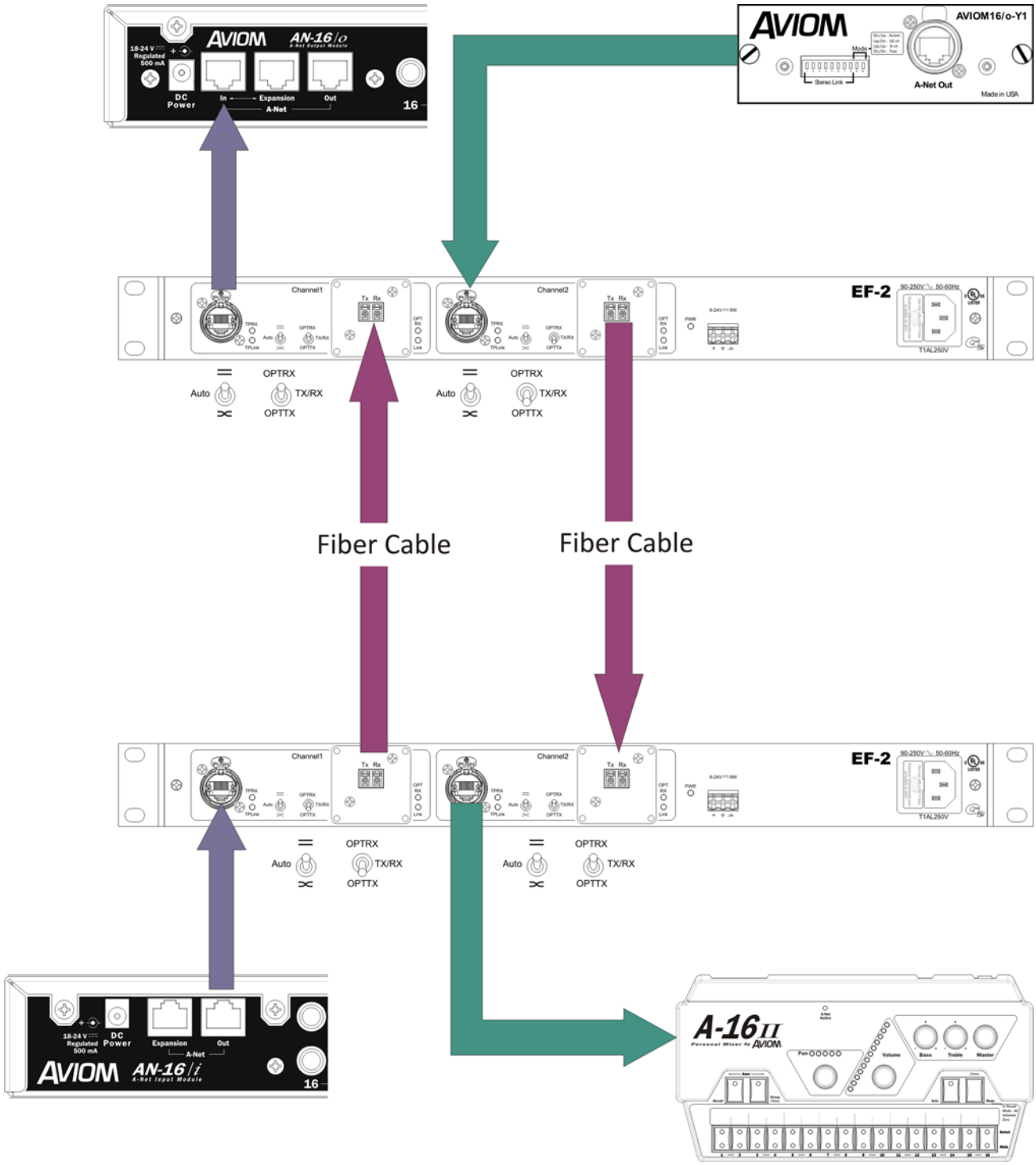
The EF-2 runs on a full range switching power supply. It will accept voltages from 90-250 VAC. This connector also serves as a fuse holder. Replace fuse only with a 1 Amp 250V (T1AL250V) slo-blo fuse.

Using the Light Viper EF-2

Standard Ethernet connection



Standard AVIOM PRO-16 connection



Fiber Options

Tactical grade military fiber (TAC-4)

Used for live production applications (P/N TFC-0000-04). Weighing 8.4 lbs.(12.6kg) for(300)feet, this cable contains (4) fibers and therefore it is capable of carrying the signals of (2) systems on a single cable. The TAC-4 connectors are hermaphroditic and can be connected to one another. Multimode fiber can transport signals up to 2km (1.25 miles).

TAC-4

Neutrik OpticalCon® Fiber

This fiber cable contains (2) fibers and is also a tactical grade fiber (P/N TFC-0000-02OC).

Neutrik OpticalCon Fiber Cable & Panel Mount Connector

PVC fiber

PVC duplex fiber contains (2) fibers. Plenum rated fiber is also available. The installer can terminate the fiber themselves, or Fiberplex can supply it pre-terminated. This fiber is also available with a strain relief and “pulling eye” which reduces on site labor.

Plenum Install Fiber

LightViper EF-2 Card Specifications

Specifications

- 2 Channel Physical Ethernet Fiber Transport
- Cable runs over 1.25 miles with no loss
- Rugged fiber cable smaller in diameter than standard mic cable
- Single direction physical layer support
- Supports all Ethernet based protocols (eg. CobraNet, HiQ Net, EtherSound, Aviom, etc)
- 9-24 VDC Power Option
- High quality Neutrik® connectors
- Heavy gauge steel construction
- 1U Rack mount
- Extended range and flexibility means limitless routing options

General Specifications

Latency	100 ns			
Operating Temp	0 to +50°C ambient temperature.			
Power Requirements	Minimum	Typical	Maximum	Unit
AC Voltage Universal 50/60 Hz, IEC Connector	90	-	250	VAC
AC Power	-	10	-	Watts
DC Voltage	9	12	24	VDC
DC Power	-	8	-	Watts
Dimensions	12.5" L X 8.75" W X 4 H 1 Rack Unit X 6.5" Deep			
Weight	6 lbs			

Data Characteristics

Data Rate	10 BASE-T	10 Mbps
	100 BASE-T	100 Mbps
Line Encoding	10 BASE-T	Manchester
	100 BASE-T	MLT3 (Multi Level Transition 3)
Interface Connector	RJ-45 (Ethercon™)	

Optical Characteristics

Standard	Fiber	Size	Max Distance	Wavelength	Output Power	Receiver Sensitivity	Loss Budget
10BASE-FL	multimode	62.5/125 µm	2 km	1300 nm	-18 dBm	-30 dBm	12 dB
100BASE-FX	multimode	62.5/125 µm	2 km	1300 nm	-18 dBm	-30 dBm	12 dB
	singlemode	9/125 µm	20 km	1300 nm	-15 dBm	-30 dBm	15 dB

Optical Fiber	**Installation Tension**	**Operating Tension**	**Min Bend Radius**	**Crush Resistance**	**Weight**
	400 lbs	130 lbs	3.7"	228 lb/in2	19 lbs / 1000'
	Attenuation	**Bandwidth**	**Numerical Aperture**	**System Optical Data Rate**	**System Operating Distance**
	1 dB/Km @1300 nm	500 MHz/Km @ 1300 nm	0.275	122 Mbs	2 Km (1.25 mi)

Appendix

Polarity Switch Settings

═══	**RJ-45 straight pinout** Pin / Direction / Description 1 / Out / Transmit + 2 / Out / Transmit - 3 / In / Receive + 4 / / 5 / / 6 / In / Receive - 7 / / 8 / / This setting is for the RJ-45 PINOUT ONLY, and is not intended to imply that all "straight" cables will establish a link in this setting. If a link can not be established with the ═══ pinouts than use the ═╳═ setting to reverse the pinouts.
Auto	The unit will attempt to determine correct pinouts for the transmit and receive pairs. If the transmit and receive pairs are reversed, the unit will swap both pairs internally to establish a link. Aviom Personal Mixers will not work in this switch setting because the personal mixers do not transmit link pulses for the EF-2 to detect. Please use the ═══ or ═╳═ setting when connecting to Aviom's Personal Mixers.
═╳═	**RJ-45 crossover pinout** Pin / Direction / Description 1 / In / Receive + 2 / In / Receive + 3 / Out / Transmit - 4 / / 5 / / 6 / Out / Transmit - 7 / / 8 / / This setting is for the RJ-45 PINOUT ONLY, and is not intended to imply that all "crossover" cables will establish a link in this setting. If a link cannot be established with the ═╳═ pinouts than use the ═══ setting to reverse the pinouts.

Directional Mode Switch Settings

OPT RX	Uni-directional mode. Data is received by the fiber optic input and transmitted out to the RJ-45. All data received by the RJ-45 is ignored except for the link pulses required to establish a link. The fiber optic output is turned off in this setting.
TX/RX	Bi-directional mode. Standard Ethernet communications.
OPT TX	Uni-directional mode. Data is received by the RJ-45 and transmitted to the fiber optic output. All data received by the fiber optic input is ignored. The RJ-45 does not transmit any data except for link pulses required to establish a link.

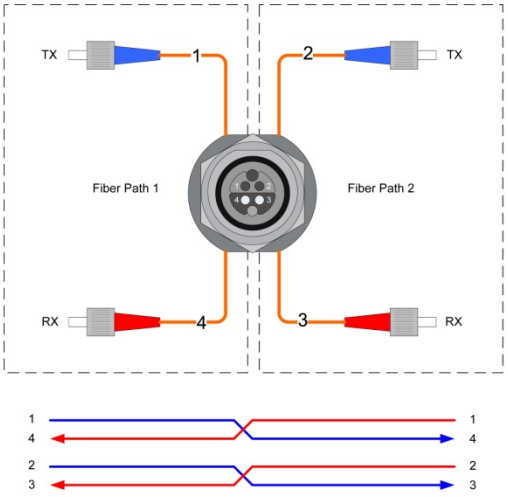
Led indicators			
	Label	**Color**	**Description**
Power	PWR	Green	Power supply is operating properly.
		Off	Check that the 1 Amp Slo-Blo fuse is not blown.
Ethernet	TP Link	Yellow	10BASE-T twisted pair link has been established.
		Green	100BASE-TX twisted pair link has been established.
		Off	No twisted pair link pulses detected. Aviom's Personal Mixers do not transmit link pulses for the EF-2 to detect. Therefore this LED will always be off. For link indication, Aviom's Personal Mixers have an LED labeled "A-NET Active".
	TP RX	Yellow	Twisted pair receive data is being detected.
Optical	Link	Yellow	10BASE-FL optical link has been established.
		Green	100BASE-FX optical link has been established.
		Off	No optical link pulses detected or optical level too low. Check that the opposite unit has power and that the fiber optic cables are properly connected. The transmit output from one end should go to the receive input at the opposite end. Or switch setting is in the OPT TX position, which is a uni-directional mode where data can only be received by the RJ-45 and transmitted to the fiber optic output. Therefore, optical link pulses can not be received by the fiber optic input.
	OPT RX	Yellow	Optical receive data is being detected.
		Off	No optical receive data detected. Or switch setting is in the OPT TX position, which is a uni-directional mode where data can only be received by the RJ-45 and transmitted to the fiber optic output. Therefore, optical data can not be received by the fiber optic input.

TAC-4 Installation Instructions

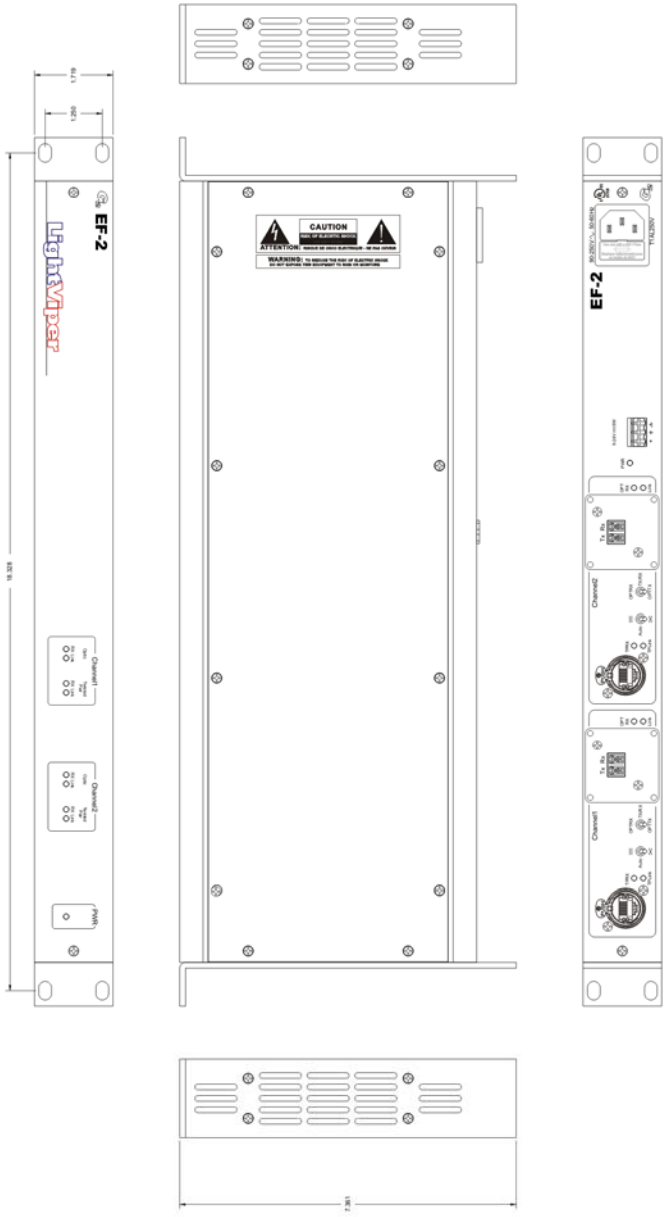
When using TAC-4 panel mount connectors:

Due to the hermaphroditic nature of the TAC-4 connector, channels 1 & 4 and 2 & 3 are crossed by necessity. Therefore, pins 1 & 2 should always be connected to connectors marked TX and pins 3 & 4 should always be connected to pins marked RX. Pins 1 & 4 are always paired together and pins 2 & 3 will always be paired together.

Important Note: A single TAC-4 connector and cable contains (4) fibers and can transport both pairs of fiber inputs/outputs of the EF-2 on a single connector / cable. If using Neutrik OpticalCon, two cables / connectors are required, one for each pair, as the OpticalCon cable and connectors contain (2) fibers. When using LC or ST fiber connectors on the chassis of the EF-2, the connectors are mounted on the rear of the unit. Alternatively these fiber connectors can be mounted on the front panel of the unit.



Final Assembly Drawing



UNLESS OTHERWISE SPECIFIED	ENGR.	HSCIII	DATE: 4/28/2009
DIMENSIONS IN INCHES	DRAWN	JD	DATE: 4/28/2009
TOLERANCES: FRACTION +/- 1/64 X.XX +/- 0.10 X.XXX +/- 0.005 ANGLES	REVIEW		DATE:
	CHECKED		DATE:
MATERIAL: #16 (0.059) CRS			
FINISH:			

fiberplex LightViper

10840-402 Guilford Rd.
Annapolis Junction, MD 20701
301-604-0100
fiberplex.com • lightviper.com

EI2 Final Assembly

FSCM:		E	117126
SCALE:	1:1	SHEET	1 OF 1

REV: A

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